IX. *An Examination of the arrangement of* Macro-Lepidoptera *introduced in England by* Mr. Doubleday, *and a suggestion as to its origin; with some strictures upon synonymic lists.* By W. Arnold Lewis.

[Read 3rd April, 1871.]

This paper is concerned with the *Macro-Lepidoptera*. Its object is to investigate the order of the groups; or (more accurately) to examine what is found upon the order of the groups in the entomological publications now usually consulted. Incidentally to this inquiry, a few reflections will suggest themselves upon the essentials of scientific authorship; and some observations will be offered upon the degrees of respect to be conceded to writers on entomological science.

The *Macro-Lepidoptera* are, according to the arrangement as I believe in general use *in this country*, divided into ten groups; the names and order of the groups as usually recognized being as follows:—1st, *Diurni;* 2nd, *Nocturni;* 3rd, *Geometræ;* 4th, *Drepanulæ;* 5th, *Pseudo-Bombyces;* 6th, *Noctuæ;* 7th, *Deltoïdes;* 8th, *Aventiæ;* 9th, *Pyrales;* 10th, *Crambi*. I say this is the order usually adopted in this country, because, though I am not acquainted with any of the leading collections, yet all those which have come to the hammer of recent years (and many of them had the sanction of well-known names,) have been so arranged. Moreover, all the exchange lists printed for use by the active collectors adopt this order, as do the lists of captures, etc., in the entomological journals. We shall almost immediately have to trace, to some extent, the steps by which this arrangement came to be introduced: but it will be well to state concisely in what particulars it most conspicuously differs from its predecessors. It differs mainly in having no group *Sphinges*, and no group *Bombyces*, but in place of those having a group *Nocturni*, and a group *Pseudo-Bombyces* only. It differs also in the location of the groups *Geometræ* and *Noctuæ*, whose place in the order is wholly altered, and in the erection of a family into a separate group *Drepanulæ*. I hope to discuss presently these different points; but I wish at

once to suggest a question: *Is there anywhere in print a justification or explanation of this order of arrangement?* And as developments of this question, a few others: Has the group *Nocturni* ever had even characters assigned it? Has the position of the *Geometræ* and the *Pseudo-Bombyces* been ever explained? Is the arrangement of the *Noctuæ* consonant with the position of that group? Have the names *Nocturni*, *Drepanulæ*, *Pseudo-Bombyces*, as applied to these insects, any sanction? Upon these questions, and others which arise, I shall endeavour, in turn, to throw a little light.

It will, however, be best to observe here, that one aim I principally have in this paper, is to sift the history of the so-called group *Pseudo-Bombyces;* against which I charge that it is not a group at all; that if a group its position in the order is erroneous; that its name is wrong; and, that the group owes its creation to certain exigencies of a fortuitous kind. In particular, and finally, I charge as a grave offence to science, that no justification of the group, nor of its name or position, was ever offered by its authors, and that it has been introduced *sub silentio* in a mere labelling list.

It is necessary to prepare the ground for our inquiry into the present arrangement of the *Lepidoptera*, by noticing briefly the system in use before its introduction. This can be done shortly, because I am primarily concerned with the order of arrangement alone; the points at which authors have drawn the line between group and group not being especially important at this stage; and the internal classification of each having nothing to do, at present, with the matter.

The order of Linnæus is the basis of every system save the one I am to examine to-night; and, without any serious deviation, it was (so far as I am aware) followed by all the world until the year 1859, when this new order saw the light. The Linnæan divisions of the *Lepidoptera* are familiar to everyone, but it is necessary to notice them here once for all. His three primary sections, then, are *Papilio*, *Sphinx*, and *Phalæna:* and his divisions of the section *Phalæna* (which correspond to our groups) are as follows: 1st, *Attacus*, and 2nd, *Bombyx;* 3rd, *Noctua;* 4th, *Geometra;* 5th, *Pyralis*. *Attacus* being now classed as a part of *Bombyx*, and not interfering with the order in any way, it is accu-

rate to state shortly, that the Linnæan order was *Bombyx, Noctua, Geometra, Pyralis.* I need not state what descriptions of species composed each Linnæan group; but it may be worth while to mention that the species of the so-called *Pseudo-Bombyces* known to Linnæus, are described in the "Systema Naturæ" as *Bombyces,* and placed with the rest of that group between *Sphinx* and *Noctua.* The Linnæan order is completely intelligible; so intelligible indeed that, I believe, almost anyone would, without a book at all, of his own accord, arrange the *Lepidoptera* in this order. The largest species, the *Sphinges,* were put first; after them the largest moths that were left, *Attacus* and *Bombyx,* the smaller division coming second. Next all the remaining moths with stout bodies, *Noctua;* after these, the slender bodies in their order of size, viz., *Geometra* first, then *Pyralis.* As I have said, this order was the simplest imaginable. It is the most matter of course thing in the world to put the biggest moth at the head of your collection, and the little ones at the end. Linnæus placed the largest group at the head of his arrangement, and the smaller groups in their order of size after it. I should be very sorry to be understood as placing the Linnæan arrangement on a low ground. It is, I think, a natural arrangement, to place the group containing the largest species first, and those containing the smallest species last, and, unless some close affinities are outraged, it is, I think, a natural arrangement to place all the groups, from the first to the last, in the order of size of the species. It is certainly the most striking of the objections to the new arrangement, that it takes you straight from the largest *Bombyces* into the *Geometræ,* from those slender insects back again into the large *Bombyces,* and then after another spell of stout-bodied moths, drops you finally into the small ones. The Linnæan groups with the Linnæan names, and in the Linnæan order, were adopted almost universally, down to the year 1840, a date from which their uniform accuracy seems, as we shall find, to have been occasionally canvassed. Fabricius followed the Linnæan order, and used the Linnæan groups; so did the famous authors of the Vienna Catalogue; and so have followed Hübner, Haworth, Ochsenheimer, Treitschke, Duponchel, Stephens, and, with special exceptions, Latreille; and so in recent times, Boisduval, Herrich-Schäffer, Westwood, Horsfield, Lederer, Staudinger, and even Doubleday.

All this array of authors of first-rate repute followed the order which, by the new arrangement of 1859, it was sought to re-model. The works of a few of the number must receive a brief consideration; but I will first and once for all present this view, which must occur to anyone who reflects much on the subject. The names of the Lepidopterists just mentioned at least equal in respectability any known in entomology. Those authors of different times and nationalities, with minds of different bents, as zealous for science as at least their successors, have proceeded to their conclusions by different and original methods; and their concurrence in one order of arrangement must be accepted as most notable. I will not enlarge on this view, because it is one which everybody can appreciate the moment it is presented, but I will merely recall here some facts showing its pertinence. It is a common-place to say that the classification of genera may depend on a great variety of details; all entomologists know that a genus may be defined by the characters of its larva, pupa, or imago, and by (1) the structure, or (2) the habits of either of the three. The differential characters in the perfect insect for instance, may be found in the palpi, in the neuration of the wings, in the legs or in the antennæ, &c.; and a variety of systems have been devised for classifying insects from some one or more of these characters. Thus Linnæus himself, after the wings, considered the antennæ of chief importance, and the order which he originated was arrived at from those characters; the Vienna Catalogue was founded entirely on the differences of the preparatory states, and that arrangement again is the same as that arrived at by Linnæus. Fabricius used as the basis of his classification the characters of the mouth-parts; he also agrees in the Linnæan order. Latreille lastly with the "eclectic" system which he devised, also agreed in that order, though with a variation presently to be mentioned. Therefore, I repeat, the concurrence among these and the other first-rate writers is a very significant fact. There is no such thing in my mind as a suggestion, that these authors *may not* all have been wrong; but the fact of their concurrence would prompt anyone to examine narrowly a proposal of radical changes, and, one would have hoped, would stimulate the proposers of changes to submit their reasons for them to our judgment.

Denis and Schiffermiller, and some others of the authors named, supply some materials which it is as well to use up before leaving our consideration of their system. First, then, in the Vienna Catalogue the groups *Sphinx*, *Bombyx*, *Noctua*, and *Geometra* are regularly arranged in sub-divisions, which are very serviceable as illustrating the connection (in the view of the authors) of each group with its predecessor or successor in order. The affinity of *Bombyx* to *Sphinx* is illustrated in this way; *Bombyx* has for its first section *Sphingiformes:* while the same relation is illustrated in like manner, thus:—*Noctua* begins with *Bombyciformes* and concludes with *Semi-Geometræ*, the *Geometræ* again beginning with *Semi-Noctuales*. This illustration of the affinity of each group to its predecessor, bears out very satisfactorily the correctness of the Linnæan order; and we shall find shortly that several later authors have seen the affinities in the same light.

It is necessary to examine with some particularity the arrangement of Latreille, not only because he is the greatest systematist who has revised the Linnæan arrangement, and was the first to propose any deviation from it; but also because he did sub-divide the *Bombyces*, and did in one of his works apply to one of his sub-divisions the name *Pseudo-Bombyces*. Latreille's "Genera Crustaceorum et Insectorum secundum ordinem naturalem in familias disposita," was concluded in 1809. The arrangement followed here he adhered to with variations in his other works. He divided all the *Lepidoptera* into *Diurna*, *Crepuscularia*, and *Nocturna*, which divisions exactly corresponded with the Linnæan divisions *Papilio*, *Sphinx*, *Phalæna*. His first family (corresponding to our group) of the *Nocturna* is *Bombycites*, including the present genera *Hepialus*, *Zeuzera*, *Saturnia*, *Lasiocampa*, *Bombyx*, *Cerura*, *Laria*, *Limacodes*, *Psyche*. Of the *Bombycites*, however, he classes a number of genera under a sub-heading as "*Bombycites Legitimæ;* les vraies Bombycites," namely, *Bombyx*, *Lasiocampa*, etc., and (what is important) *Cerura*, *Pygæra*, and *Clostera*. In order to show the bearing of this circumstance, I may mention here, that these very three genera, *Cerura*, *Pygæra*, and *Clostera* "vraies Bombycites" of Latreille, are (with others) now, by the new classification, separated from the group, and called in terms "*Pseudo-*" or "false" *Bombyces*. Latreille's first group of *Nocturna* being the *Bombycites*, his next is

Noctuo-Bombycites, including *Arctia* with its allies, *Lithosia* with its allies, and all the *Tineæ;* and his third group is *Noctuælitæ*. His fourth group following on the *Noctuælitæ* is *Phalænites*, being all the *Geometræ*. After the *Phalænites* come the *Pyralites*. Now this arrangement of Latreille's follows closely the Linnæan arrangement, except only in placing the *Tineæ* between *Bombyx* and *Noctua*. The names and order of his groups, remark, are *Bombycites*, *Noctuo-Bombycites*, *Noctuælitæ*, *Phalænites*, *Pyralites*. This shows no deviation at all from the Linnæan arrangement; but it is the fact, that on examination we find the group *Noctuo-Bombycites* to include the *Tineæ*. In his "Considérations générales sur l'ordre naturel," etc. (published in 1810) Latreille observes almost identical divisions, and in the introductory portion (p. 81) he states that the *Lithosiæ* are the connecting link between *Bombyx* and *Noctua*, and he places the *Tineæ* with the *Lithosiæ* on account of their affinity to them.

In his volume of Cuvier's "Familles naturelles du Règne Animal," (edition 1825), Latreille's first group of *Nocturna* is *Bombycites*. His second takes the name *Pseudo-Bombyces* (against which in a parenthesis the name "*Noctuo-Bombycites*" is printed, apparently as a synonym). Third come the *Tineites;* fourth again the *Noctuælites;* but fifth here, the *Tortrices* (including *Pyrales*); then sixth, the *Phalænites;* seventh, *Crambites*. The thing chiefly noticeable in these arrangements of Latreille is, so far as our inquiry is concerned, that throughout, his *order* of the groups we are discussing, is *Sphinx*, *Bombyx*, *Noctua*, *Geometra*. There is no suggestion that it was proper to bring *Geometra* next to *Bombyx;* nor to separate the species of *Bombyx* by placing *Geometra* between them; nor to place *Geometra* before *Noctua;* nor indeed to deviate at all, so far as these groups are concerned, from the Linnæan order. We do find, however, that Latreille used the greatest freedom in altering the position of the groups where that appeared desirable, and moved about at his pleasure the *Pyralides*, *Tortrices*, and *Tineæ*.

We must now turn to the group *Pseudo-Bombyces*, first used by Latreille in his last work, the 'Règne Animal.' His *Pseudo-Bombyces* include *Cossus* and *Zenzera*, *Dicranura*, *Platypteryx*, *Notodonta*, *Orgyia*, *Limacodes*, *Callimorpha*, *Arctia*, *Chelonia*, or in fact by far the

greater number of species in the original *Bombyces*. It *is* important not to overlook this fact, that here we have *Dicranura* and *Notodonta*, which are included in the *Pseudo-Bombyces* of the new arrangement, also included in a group of Latreille bearing the same name. This is, I think, the nearest approach to a justification of the new arrangement which has appeared in print, and it is, therefore, important to allow it its full influence. How slender a justification it in truth proves we shall very shortly find.

The new group *Pseudo-Bombyces* takes away twenty-seven species, and separates them from all the other *Bombyces*. They are placed so far away from all the other *Bombyces*, that we are bound to believe the authors of the arrangement discover in those species a complete difference of structure, or other striking dissimilarity, from the remainder of the Bombyciform genera. That should be, of course, the sole rationale of the creation of the group.

Now, that being the case, what justification or support does the new division of the *Bombyces* receive from the fact, that Latreille had before effected a subdivision of the group? Latreille's group, *Pseudo-Bombyces*, so far from isolating at a distance from the *Bombyces* only twenty-seven species, itself includes the bulk of the *Bombyces;* and, what is most important, groups together, as allied with the separated genera, many others from which the new arrangement takes them away. Latreille does call *Dicranura* and *Notodonta Pseudo-Bombyces;* but he also calls *Pseudo-Bombyces* the genera *Cossus, Arctia, Orgyia*, and many more, considering all these to bear to the true *Bombyces* the same relation as is borne by *Dicranura* and *Notodonta*, and presenting them in close relationship with *Dicranura* and *Notodonta* in the same subdivision. Latreille's arrangement of the species in fact strengthens the case against the new group *Pseudo-Bombyces;* and though he called some genera by that name, they were not placed as the new group is placed, nor are they, as a group, distinguished by the same characters. But, in truth, Latreille, in his last work, divided the *Bombyces* on a very simple plan, which is found stated at p. 472 of his vol. of the "Règne Animal." His group *Bombycites* is confined to those species "dont les ailes inférieures n'ont point de frein," and that is the distinction by which he was guided.

There remains his placing of the *Pyrales* (in this last work) next after the *Noctuæ* and before the *Geometræ*. This is clearly a step in the direction of the new arrangement, and it remains as some testimony in its favour; but Latreille considered *Pyralis* as a division of *Tortrix;* and *Crambus*, which he admitted to be separate, he placed *after Geometra* (as in the Linnæan order), away from *Pyralis* altogether: so the new arrangement *Noctua*, the *Deltoides, Pyralis, Crambus, Tortrix*, obtains very small countenance from Latreille.

I now leave this author, whose various classifications, the work of a vigorous and intrepid systematist, all strongly favour the coherency of the Bombyciform genera; and the order of arrangement, *Sphinx, Bombyx, Noctua, Geometra*.

Hübner's arrangement also affords a contrast in the classification of the *Bombyces*, to the new one now in vogue. One of his three sections is termed "*Veræ*" (or "the true"); and this section includes *Clostera* and *Diloba*, two genera of the new "*Pseudo-*" *Bombyces*. The remainder of the species of this so-called group Hübner classes under the name *Sphingoides*, and places *at the head* of the *Bombyces* following the *Sphinges*. Now, anything in the same class of natural objects more dissimilar than *Sphinx* and *Geometra* I have never read of. Hübner considered *Notodonta* as allied to *Sphinx:* the promoters of the new arrangement appear to consider it allied to *Geometra*. Hübner, also like the authors of the Vienna Catalogue, illustrates the affinities between the groups by using appropriate names; thus, besides the *Bombyces* commencing with the *Sphingoides*, he makes the *Noctuæ* commence with *Bombycoides*, and end with *Semi-Geometræ*, etc.

There are but two other writers before 1840, whose works it is necessary to notice (one of them an Englishman), Dr. Horsfield and M. Guenée. A very few words will express all that need here be said about both.

Dr. Horsfield plans out the *Macro-Lepidoptera*, following the Linnæan order without the smallest deviation. His *Bombycidæ* include, of course, *Pygæra, Cerura, Notodonta*. He has no group *Pseudo-Bombyces*. The fifth and last section of his *Noctuidæ* is *Semi-Geometræ*

(as in the Vienna Catalogue and Hübner's "Verzeichniss"). The first of his sections of *Phalænidæ* is also *Semi-Noctuales*. His order is *Bombycidæ, Noctuidæ, Phalænidæ, Pyralidæ*.

M. Guenée, in 1837, contributed to the Annals of the Entom. Soc. of France, the first of a series of papers on the classification of the Noctuélides; and as everyone would expect, he makes the group, if I may use the expression, "face towards" the *Bombyces* at the beginning, and towards the *Geometræ* at the end. He places first the tribe *Bombycoïdi* to illustrate the affinity to *Bombyx*, and last the tribe *Noctuo-Phalænidi* to illustrate the affinity to *Geometra* (or *Phalæna*), both names being the names of Dr. Boisduval—an arrangement which in 1841, indeed, when he contributed a revision of his classifications, M. Guenée confirmed and re-published.

Thus up to the year 1840, at all events, we have found no trace of a disposition to alter the place of the *Bombyces, Noctuæ*, or *Geometræ*. On the contrary, all the writers have preserved the three groups in their original order, and we have found German, English, and French authors fortifying this arrangement, and supplying in their nomenclature additional illustrations of its propriety. Two authors also, as if to secure by anticipation the recognition of certain species as *Bombyces*, have named those *Bombyces* "*veræ*" and "*legitimæ*," which it is now sought to call "*Pseudo-*" *Bombyces*.

We shall still find (starting from the year 1840) that no matter where the divisions were made, the order observed was, for some time, substantially the same.

One of the best known methodical lists is Boisduval's "Genera et Index Methodicus Europæorum Lepidopterorum." The second edition of this work was published in 1840. His arrangement is very simple, and his division of the Lepidoptera into *Rhopalocera* and *Heterocera* is known everywhere. Boisduval separates the three first groups of the *Heterocera* into tribes, and it is in his arrangement that we first miss the use of the appellations *Sphinx* and *Bombyx* as the names of groups, a feature which distinguishes also the new arrangement. To the families constituting these groups he gives, it seems, no collective name, merely heading the division "Larvæ

progressoriæ" (see p. 39). This is the only important change introduced by Boisduval's Index. In all other respects it closely follows the Linnæan arrangement. The *Micro-Lepidoptera* were the subject of a continuation of the "Index" undertaken by M. Guenée. The noticeable feature of that arrangement is the insertion of the *Pyrales* and *Crambi*, after *Tortrix* and before *Tinea*, an arrangement which has now, it seems, no apologists.

In the year 1840, appeared Mr. Newman's "Familiar Introduction to the History of Insects; being a new edition of the grammar of Entomology," one book of which is devoted entirely to an exposition of the author's views upon classification (Classif. Lepidop. pp. 209-215). His order is—including remark, Butterflies and Moths all in one:—1st, "Hawk-moths or *Sphingites*," including all the *Sphingina*, except the genus *Trochilium* of Stainton, the small clearwings: 2nd, "Skippers, or *Hesperides*;" 3rd, "Butterflies;" 4th, "Loopers, slender-bodies, or *Geometrites*;" 5th, "Half-loopers, or *Phytometrites*," *Plusia, Acontia, Erastria, Phytometra*, and the rest; 6th, "Full-bodied moths, or *Noctuites*;" 7th, "Millers, or *Arctiites*," *Acronycta, Spilosoma, Arctia, Hypercompa, Lithosia, Hypogymna, Laria, Orgyia;* 8th, "Eggars, or *Bombycites*," *Eriogaster, Odonestis, Gastropacha, Lasiocampa;* 9th, "Emperor-moths, or *Phalænites*," *Saturnia carpini* alone; 10th, "Prominents, or *Notodontides*," *Endromis*, (!) *Cerura, Stauropus, Platypteryx, Cilix, Notodonta, Pygæra, Clostera;* 11th, "Wood-eaters, or *Xyleutites*," *Hepialus, Xyleutes, Zenzera;* 12th, "Clearwings, or *Ægeriites*," *Ægeria;* 13th, "Burnet-moths, or *Glaucopites*," *Zygæna, Ino;* 14th, "Pearl-moths, or *Pyralites*;" 15th, "Veener-moths, or *Crambites*."

In the preface (p. ix) Mr. Newman gives his own view of his own arrangement. "The Fourth Book, entitled Classification of Insects, may be charged with being too original; it may be said that the author should have given the views and arrangements of others in preference to his own. He would ask, whose system was he to select? That his own is the most simple, and the most readily understood, no one will deny;" and he adds (two pages later) "it would be false modesty for the author to pretend blindness to the fact, that the humble efforts of his pen and pencil have been unusually successful," &c. It

rather takes away one's breath to be told this strange looking arrangement is "the most simple," but as it is not accompanied by a word of reason, we may suppose Mr. Newman really thought it was. It is unfortunate that this particular "effort" was not so successful as to prevent its being abandoned by its author; for it seems to be the case that, neither he nor any other entomologist ever followed the scheme.

One remarks in this arrangement that, though the *Sphinges* are cut up and separated widely, the *Bombyces*, *Noctuæ*, and *Geometræ* are all kept together, and, while the arrangement is chiefly noticeable for its eccentric treatment of the *Sphinges*, it is in other respects nearly the Linnæan arrangement read backwards. In particular, Mr. Newman, like Denis and Schiffermiller, Hübner, and Horsfield, connects *Noctua* with *Geometra* by means of *Plusia* and its allies; and like Hübner, he places *Notodonta* as far away from *Geometra* as it could well be. No one, so far, has connected *Geometra* with *Noctua* by means of *Notodonta*, the great feat of the new arrangement.

Also in 1840, was published Professor Westwood's "Introduction to the Modern Classification of Insects," a work (if I may be allowed to say so) characterized by wide learning and very close study. The author professes his inability to offer a satisfactory classification of the *Lepidoptera* in main tribes or groups, but, using only large family divisions, he adopts exactly the Linnæan order, following Latreille and Stephens in making *Lithosia* the connecting link between *Bombyx* and *Noctua*.

Mr. Westwood's book supplies numerous expressions of opinion, and various reasons, in favour of the Linnæan arrangement, of which I will reproduce a few in his own words. He speaks of "the transition from the *Noctuidæ* to the *Geometridæ*, so beautifully effected by *Catocala*, *Plusia*, and other half-loopers, as their larvæ are termed, and *Ophiusa*, *Erastria*, &c." (Westw. Introd. ii. p. 363.) Again (p. 370), "there appears to be but little relation in the imago state (between *Ægeria* and *Zenzera*), either in respect of their habits or structure, so that it may be questioned how far the relation is more than one of analogy; at all events, I hesitate as to the propriety of placing the *Ægeriæ* in the same natural group with *Hepialus* and *Cossus*." I need hardly remind Lepidopterists that one

of the features of the new arrangement is to place *next together* those two genera in the group called *Nocturni*. Again (p. 385), "I find it impossible to draw a line between the types which form Stephens' two families, *Notodontidæ* and *Arctiidæ*. The structure of the mouth will not assist in the inquiry, because *Pygæra*, *Cerura*, &c., amongst the *Notodontidæ* have the maxillæ, and even the maxillary palpi, developed as strongly as in *Spilosoma* and *Arctia*, whilst there is as great a variation in the transformations of the genera of either group as there is between the respective species of the two groups; hence I have followed Latreille in keeping them under one family." Those genera which Mr. Westwood felt constrained to include in one family are now, by the new arrangement, separated by hundreds of species, including the whole group of *Geometræ*. And again (p. 363), "It seems unquestionable that *Sphinx* (or the hawk-moths), *Bombyx* (or the feather-horned full bodies), &c., are, as Linnæus considered them, amongst the primary types." Neither *Sphinx* nor *Bombyx* is, in the new arrangement, acknowledged as a type at all.

But to proceed. Not long after Mr. Westwood's book was written, came Mr. Doubleday's first "Synonymic List," proposing the first instalment of the great changes which were at hand. The first pages (1-8) were published in October, 1847, and they went as far as the genus *Tæniocampa* (in the *Noctuæ*), proceeding in the Linnæan order through *Rhopalocera* (so called in the List), *Sphinges* (so called), and *Bombyces* (so called). In the following month (November, 1847) some more pages (9-16) came out, carrying the list through the remainder of the *Noctuæ* well on into the *Geometræ*. Thus Mr. Doubleday, like all who preceded him, adopted the old order, leaving no doubt that (1) *Sphinx*, (2) *Bombyx*, (3) *Noctua*, (4) *Geometra*, was then, according to his view, the correct arrangement. In August, 1849, there was a complete re-issue of pp. 9-16, apparently for the express purpose of taking in the *Pyrales* between the *Noctuæ* and *Geometræ*. This order, at all events, was observed on pp. 13, 14, and 15 of the re-issue; and, accordingly, Mr. Doubleday's first list, when concluded at the close of 1849, showed the following order: *Rhopalocera*, *Sphinges*, *Bombyces*, *Noctuæ*, *Pyrales*, *Geometræ*. At this time, therefore, the change was not very great or

startling, for Latreille had before (as we have seen) tried the *Pyrales* in different positions without leaving them very satisfactorily placed. But this alteration in the Linnæan order by Doubleday was, nevertheless, openly dissented from by Mr. Stephens, and it did not obtain, I believe, the adhesion of entomologists.

Next, in 1852, was published the first vol. of M. Guenée's "Noctuélites," and on p. 2 of that work, we find his ideas on classification. He says, "The *Noctuæ* can be placed indifferently after *Bombyx* or after *Geometra*. They unite with the former by the *Noctuo-Bombycides* and *Bombycoides*, and with the latter by the *Anthophilides*, *Erastrides*, and *Phalænoides*. *If this last disposition were adopted, it would be necessary to attach* GEOMETRA to BOMBYX *by the genera* AMPHIDASYS, NYSSIA, *&c., and to the* NOCTUÆ *by the families just mentioned*" (*namely* ANTHOPHILIDES, ERASTRIDES, PHALÆNOIDES). This, I think, is a most important passage; and then follows this sentence: "But up to this time, all the authors have placed the *Noctuæ* immediately after *Bombyx*, and when I reflect that the bouleversement of that order adopted for such a long time, would have nearly as many inconveniences as advantages, I feel little disposed to make an innovation." Now here we have a candid suggestion by M. Guenée, of a plan for placing the *Geometræ between* BOMBYX *and* NOCTUA; and he says that if this be done, the *Noctuæ* must begin with *Erastria* and *Anthophila*, which would require a complete re-arrangement of the group. Not a word, remark, is here said by the author of the new system about dividing the *Bombyces*, and placing the *Geometræ* between the sections. The whole passage tends directly to this, that if effect is to be given to the affinity of *Bombyx* and *Geometra*, it must be by placing *Geometra* next to *Bombyx*, and then securing the transition from *Geometra* to *Noctua*, by a re-arrangement of the latter group. Too much weight can hardly be given to this opinion.

M. Guenée, therefore, having decided in 1852 not to disturb the arrangement, described the "Noctuélites" in the old order, that is, beginning with the *Bombyciformes*, and having the Geometriform families at the end. When his work had proceeded as far as the *Geometræ*, M. Guenée (in the 'Généralités,' vol. 9, p. x) returned to the subject. He says, "you can attach the *Phalænites* to nearly all the other divisions of the *Nocturna*. Thus, the *Noctuæ* give

us as a transition, the *Erastrides, Catocalides, Brephos,* and all the family of the *Thermesides;* the *Pyrales* present to us a crowd of species with large and slender wings, which the old authors have confounded with the *Geometræ;* the *Deltoides* approach them still more; lastly the *Bombyces* include, in nearly all their principal sections, families which border upon them"—naming with others, *Euchelia, Platypteryæ, Saturnia, Lithosia.* Thus M. Guenée in 1857.

The first volume of Stainton's Manual was completed in the same year; and the order there observed is, everyone knows, the Linnæan order. A writer in the "Natural History Review," attacked Mr. Stainton on the subject of his arrangement, and in particular for departing, forsooth, from that introduced in Mr. Doubleday's list of synonyms. The "Substitute," in a later article (Substitute, 1856-1857; p. 14, Art. "Change of names") took occasion to correct the first-named writer, and inform him that a list without descriptions or characters was "no authority at all for quotation," a dictum in which I venture to express my strong concurrence.

In the year 1858-59, Mr. Doubleday was getting ready a new catalogue, and the authors of the then shortly forthcoming "Accentuated List" were favoured, we were told, with a sight of it. They straightway copied the new list out of hand, and the first knowledge entomologists in general had of the mercies in store for them, was obtained on the appearance of the "Accentuated List." The "Intelligencer" of that date published some comments on the new arrangement, and, in particular, protested against the *Geometræ* "being placed sandwich-like in the midst of the *Bombyces.*" (Intel. vol. v. p. 169, Art. "Practicability.") The arrangement of the new list was, however, almost universally followed, notwithstanding the discouraging fact that there was no descriptive work which followed that order, and the actual nomenclature differed, in numerous cases, from all the existing English descriptive works in use. This great change was completely unsupported by any statement of the reasons supposed to render it advisable. The cause of the silence was not that the reasons were obvious, or that the changes explained themselves. How many owners of large collections would, if sitting down to-day to arrange them "out of their heads," hit upon

the arrangement of Mr. Doubleday? I suppose it is quite certain that not one would place the species in anything approaching to that order. Ever since the publication of this second List* of Mr. Doubleday, we in England have been subjected to the discomfort of having to acknowledge two rival systems, the advocates of either of which take the smallest recognition of the other. The rights and wrongs of the matter have never been fought out in consequence; a thing, perhaps, not difficult to account for, when we consider that the one party have never shown, or professed to show, any reasons for their scheme. Meanwhile, in 1866, Mr. Doubleday's list saw another edition. In 1867, Mr. Stainton published another book on Butterflies and Moths, and a considerable portion of it is concerned with classification. It takes no notice whatever of the new order, and reproduces that of the Manual. At the same time, Mr. Newman brings out his descriptive work, the "Natural History of British Moths," in which he follows Mr. Doubleday. Lastly, in 1870, Dr. Knaggs prints a new list on the side of Mr. Stainton; and Dr. Staudinger only this year has brought to the side of the Linnæan order another edition of his elaborate Catalogue, which has indeed reached our hands in England only within the last few days.

The alteration in the position of the *Geometræ*, suggested by M. Guenée as an alternative scheme of arrangement, had not, until the year 1859, attracted much attention; but the primary idea of Mr. Doubleday's List was, it seems to have been considered, the carrying out of that idea. At the same time, other and startling variations in our arrangement were introduced; the *Sphinges* and *Bombyces* were then rolled into one group; and a family of *Bombyces*, the *Notodontidæ*, being detached and separated by the whole group of *Geometræ* from the main body, was erected into a group by itself; the family *Platypterygidæ* was erected into a principal group, and inserted next after the *Geometræ*, and before the detached *Notodontidæ*. The revolution was signalized, as in the Year One of the French Republic, by things being named anew.

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* It would be invidious to push comment on this head much further; but, if any course more than another be calculated to invite hostile criticism of this publication, the rhapsodical eulogy of it by its authors' friends is certainly that one.

The Butterflies were no longer *Rhopalocera*, but were named *Diurni;* the heterogeneous collection of *Sphinges* and part of the *Bombyces* was named, with a pugnacious disregard of tradition, *Nocturni* (the name *Nocturna* being already well-known as designating, in Latreille's arrangement, all the moths outside the *Sphingidæ*). The family *Platypterygidæ*, not increased or reduced by a single species, was now termed *Drepanulæ;* and, greatest defiance of all, the separated *Notodontidæ*, being all the species included in that family by Stainton, and all save one originally so named by Stephens, were termed *Pseudo-Bombyces*.

The names introduced by the revolutionists are all, I venture to think, unfounded and unsustainable.

They term the Butterflies *Diurni;* and no doubt would say in justification, that in doing so they merely revived the name given by Latreille. Latreille's name was a completely good name according to Latreille's system; for that system established three leading groups designated according to their time of flight. Latreille's Butterflies were *Diurna*, but his *Sphinges* were also *Crepuscularia*, and all the other Lepidopterous insects he termed *Nocturna*. The division by times of flight has long been abandoned, for many reasons; the most simple being that the names conveyed a wholly erroneous notion of the actual habits of the species, since a crowd of insects besides the *Diurna* are known to fly by day. In the face of this history of the name, it was surely an error to revive it; the name *Rhopalocera* for the butterflies had been fully accepted by entomologists, and the change was altogether gratuitous.

But what of the name *Nocturni* for *Sphinges* and *Bombyces* together,—even putting aside for the present, the absurd union of these groups, which has been discountenanced even by the followers of the new arrangement? This name *Nocturni* is also, we have seen, completely understood by entomologists as designating one of Latreille's three great divisions, the distinction between *Nocturna* and *Nocturni* not being, I suppose, a matter of which any nomenclator would make very much. The use of those divisions is not continued at the present day, but the name has its history in entomology, as indicating a different group of insects from that to which it

is now sought to apply it. There is surely no justification for it here, and indeed the more it is examined, the more uncalled for it seems to be.

First, the name would appear to suggest a fictitious antithesis, or contrast with the *Diurni* immediately preceding.

Secondly, this name could not be accepted unless the group comprised all night-flying species, and the *Lepidoptera* has again to be classed according to their time of flight.

Thirdly, the pretended group comprises very few of the true night-flying species at all; and does include a large number of species which fly only in the sunshine, *e. g.*, *Macroglossa*, *Sesia*, *Procris*, *Zygæna*.

Fourthly, the pretended group includes the *Sphinges*, which, if they are to be classed according to their time of flight at all, must be called by the earlier name *Crepuscularia*.

Next, *Drepanulæ*. Since when has it become allowable to supplant the received name of a family by a new one? It is notorious that this cannot be done in the case of a species or genus. The so-called "*Drepanulæ*" (termed *Drepanulidæ*, without authority given, by Dr. Knaggs) are, species for species, the *Platypterices* of Hübner, the *Platypterycidæ* of Stephens' Illustrations, the *Platypterygidæ* of Stainton's Manual; the name, without any alteration of the constituent parts of the family, is sought to be altered to *Drepanulæ*, on the erection of the family into a petty group. Without wishing to impute a shabby motive, I protest I can find no reason for this alteration, except that before hinted at, viz., the passion for a new coinage and new nomenclature for everything, which has in every age, been the weakness of innovators.

Now, *Pseudo-Bombyces*. This name is very flagrant. First, because it is an old name used by more than one author to express different assortments of species, neither of them the same as that to which it is now applied; secondly, because the genera forming this supposed group have a prior name completely recognised; thirdly, because of the illogical relation of the name to the other names in the same scheme of classification.

The name "*Pseudo-Bombyces*" was, it appears, first used by Haworth, who in his "Lepidoptera Britannica," thus designates a variety of *Noctuæ* having pectinate antennæ. The species classed together by Haworth under this name are mostly now included in our genus *Agrotis*. Next, Latreille in the "Règne Animal" uses the same name, as we have found, for one of his sections of the *Nocturna*, there grouping under that name the *Arctiidæ*, *Notodontidæ*, and *Lithosidæ*. Thus the name *Pseudo-Bombyces* has already a historic meaning. If Haworth's name passed for nothing, Latreille's classification at least was the work of a great systematist; and surely the name which he gave to a certain group of genera cannot be now applied with propriety to another. If such a practice were generally allowed, endless confusion would be caused. Timid writers would take care to get favour for new arrangements by using old names; and we should soon have the *Pseudo-Bombyces* of Haworth, of Latreille, of Guenée, and of this, that, and the other writer, all meaning different things. A confusion of this kind is very easily guarded against. A general law, that no group distinguished by characters different from those of the original group, shall bear the name of the original group, meets the difficulty—and, perhaps, only expresses what has been the practice of accurate authors.

Stephens, in his "Illustrations," unites all the so-called *Pseudo-Bombyces* into one family, which he names *Notodontidæ;* and Stainton, in his Manual, describes them species for species, under the same name. On this ground the name *Pseudo-Bombyces* cannot, I assume, be upheld.

But the reason which at once disestablishes the name *Pseudo-Bombyces* for this so-called group is founded on its own illogical position. The authors Haworth and Latreille each recognized a group *Bombyces*, and therefore for them to call another group *Pseudo-Bombyces* was not improper or ridiculous. To ignore the existence of the *Bombyces* as a natural group, and yet to exalt into a natural group genera, whose common characteristic is a certain definite unlikeness to the *Bombyces*, is a performance in all respects worthy of a writer who, without giving any reasons, interferes with the work of other men. The blunder is of the same character as would be a proposal to tax, according to its wheat produce, a

country in which cereals did not grow; or to express in dry measure the standard height for our recruits!

One point on the subject we have just left, it may, perhaps, be desirable very shortly to notice, as it might be considered I had overlooked it. It may be urged that the names *Platypterygidæ* and *Notodontidæ* terminating in *-idæ*, are the names of families and not groups, and that therefore when a group was to be expressed, it was necessary a name with a different termination should be used. The reasoning put forward must be either that—

(1.) The name of a group has a fixed termination other than *-idæ;* or, that—

(2.) The termination *-idæ* is exclusively used to indicate some other distinction.

And neither of these contentions is true. Mr. Stainton, for instance, in the Manual, uses a uniform termination for the names of the groups, viz., *-ina;* "Sphingina," "Bombycina," and the rest; but there is no sort of uniformity among the authors. Linnæus uses the nominative singular, "Phalæna;" and the same for the genera, our groups; "Attac*us*," "Noctu*a*," "Tortr*ix*." Latreille's three groups end in "*-a*," the neuter plural; but his primary sections have any termination at hap-hazard, thus: "Aposur*a*," "Tortr*ices*," "Deltoi*des*," "Tinei*tes*." The list now in vogue, following the new arrangement uses, as did Hübner in his "Verzeichniss," the simple form "Noctuæ," "Pyralides," "Crambi,"—a practice actually objectionable, because those plurals also indicate (in modern usage) the species of *the genera Noctua, Pyralis, Crambus.* There is certainly no sanction for a contention that the names of groups must be of uniform termination.

Neither is it true that the termination *-idæ* is exclusively used to indicate the name of any other division. Families in the modern books usually have that termination *e. g.* again, those of Stainton in his Manual. But Guenée uses the same termination for his two leading sections of the Noctuélites, *Trifidæ* and *Quadrifidæ;* and without looking further afield, Dr. Horsfield, as well as Mr. Stephens (see the Introduction to his "Systematic Catalogue"), have used the termination *-idæ* to indicate the very thing we are upon, the name of a group.

Besides (to return) it would seem that if the authors of the new names felt a difficulty of this kind, they should, according to their own plan have named their groups "Platypteryges" and "Notodontæ," and there was no sort of necessity to invent new titles.

With reference to the species constituting the new group *Pseudo-Bombyces*, we have already seen that some were before considered so closely akin to certain *Bombyces*, that they were placed in the same family with them. On the other hand, the species now collected were by Latreille considered so dissimilar among themselves, that he placed them three of his families apart, the species of the genus *Notodonta* being classed with the *Noctuæ*, in Gen. Crust. &c., vol. iv.

The new grouping places twenty-seven Bombyciform moths a long distance away from their allies, between these and the main body, being the whole of the very distinct group *Geometræ*. That arrangement could only be supported by showing that the *Geometræ* naturally connect the *Bombyces* with the *Pseudo-Bombyces*; but there is not the slightest reason for saying that the last-mentioned, or, if you please, "aberrant" *Bombyces* are connected with the other *Bombyces* through, or *by means of* the *Geometræ*. No author who has written with reasons has ever suggested, remark, the possibility of such an arrangement. The relationship of the "aberrant" to the "true" *Bombyces* (I use these terms strictly under protest) is direct; some families of the latter pass gradually into the separated family *Notodontidæ*, so plainly, that one learned author refused, as we have seen, to consider the *Notodontidæ* anything but a part of the *Arctiidæ* (Westw. Introd. ii. p. 385); and Latreille also classes them in one family. The *Notodontidæ* may, nevertheless, present such differences from the typical *Bombyx*, that they should not be classed in the same group. But their position even then should be *next* to *Bombyx*.

On leaving the so-called *Nocturni*, we leave several families of moths characterised by their strong and thick wings, robust bodies, and antennæ pectinate in the males; whose wings in repose meet roof-like over the abdomen, whose larva has sixteen legs, and walks without looping.

We are next taken through the *Geometræ*, and there find numerous families of moths whose wings are thin and weak, whose bodies are slender, whose antennæ are simple or filiform in the males, whose wings in repose are extended, or put up vertically, whose larva has ten legs, and cannot walk without looping. We are then again brought back to an isolated set of twenty-seven moths agreeing with the families from which we first started, having strong and thick wings, robust bodies, pectinate antennæ, wings in repose meeting roof-like, whose larva has sixteen legs.

The reasons for this startling arrangement, if I am at liberty to guess them, centre in this, that between the *Geometræ* and the twenty-seven *Bombyces*, a connection can be made by means of *Platypteryx*. In other words, we are taken from the *Bombyces* by a leap into the *Geometræ*, in order to be shown by what easy stages we can be brought from the *Geometræ* back to the *Bombyces* again! The fact that *Platypteryx* joins *Geometra* and *Bombyx* is thus made the most of; but, even so, the new order has, as it were, a rough edge, because the junction of the true *Bombyces* (or *Nocturni*) with *Geometra* is not effected by closely related species.

Now, let me endeavour to account for this extraordinary group *Pseudo-Bombyces*. No one has vouchsafed a line of explanation, and it is not my fault if I am all abroad.

The arrangement of the *Noctuæ*, in the different books, had been conceived with a view to the position of the group between the *Bombyces* at the one end, and the *Geometræ* at the other. The species least akin to the *Geometræ* had been put furthest away from the *Geometræ*; the species least akin to the *Bombyces* furthest away from the *Bombyces*. In the year 1852, M. Guenée—who in 1841, as we have seen, followed the same arrangement—described or catalogued the *Noctuæ* in this, the old order, beginning with the species akin to *Bombyx*. M. Guenée's work has taken its place as the chief work upon the *Noctuæ*; and the author of it would not, it may be expected, be inclined, shortly after the book's completion, to favour a new arrangement, which would render it less an authority.

The affinity between the *Geometræ* and the *Bombyces* seems in, or just before 1859, to have struck M. Guenée as of greater importance than he had before considered

it; and in that year (as it is well understood, at his suggestion) Mr. Doubleday's second List introduced the new arrangement. Let us bear in mind the important consideration that, in Mr. Doubleday's List, the order of arrangement of the NOCTUÆ was not changed. That remained the same as when the group followed next after the *Bombyces*, and the *Geometræ* came at the end. *Bombyciformes* is still the first section (including the families *Noctuo-Bombycidæ* and *Bombycoïdæ*); and at the end come the various *Quadrifidæ* with their half-looping larvæ (including the species acknowledged as *Noctuo-Phalænidi* by M. Guenée himself in 1841).

It appears to me that this fact controlled the rest of the arrangement. The order of the *Noctuæ* begs the question of the group's position; and it was, therefore, necessary to start the *Noctuæ* from somethimg Bombyciform. The new arrangement was introduced to give effect to the affinity between the *Geometræ* and the *Bombyces*, and this was carried out by placing the two groups in juxta-position. Now, if the *Geometræ* had only been brought up and placed next to the *Bombyces*, the *Noctuæ* making way for them, would have had *to follow* the *Geometræ*. The complete re-arrangement of the *Noctuæ* would then have become necessary in view of their changed location. But there were weighty reasons against proposing a re-arrangement of the *Noctuæ*. Not only had this group been long described in the books, in the order which it would be necessary to abandon; but M. Guenée himself had, within a very few years, completed an exhaustive work, whose order of arrangement would also have become obsolete. M. Guenée would of course be disposed to see advantage in a plan, which, while giving full play to the affinity between *Geometra* and *Bombyx*, at the same time preserved and vindicated his own previous arrangement of the *Noctuæ*. And here I think we find the reason of the existing order.

It was necessary in the first place to join the *Geometræ* to the *Bombyces*, in order to exhibit what in the new view was the natural relationship between these groups. But, to preserve the union of the *Noctuæ* with the *Bombyces* was equally necessary, if the existing arrangement of the former was to be upheld. These two objects were accomplished in the only way possible; and the steps by which they were accomplished were the natural ones for that purpose.

The only way in which it was possible to join on to the *Bombyces*, both *Geometræ* and *Noctuæ*, was to divide the first-named group, and fasten the *Geometræ* to one part, the *Noctuæ* to the other. M. Guenée had even more recently been engaged upon the *Geometræ*, and no rearrangement of this group was likely to be proposed by him. On the arrangement of the *Bombyces*, however, he was unfettered, having published no views upon the order of that group.

This measure of dividing the *Bombyces* once determined on, all the details were, it seems to me, matters of necessity. The *Platypterygidæ* have affinities both with the *Bombyces* and *Geometræ;* and that family, therefore, would not occupy an unnatural position, if made a connecting link between the two groups. This happy invention of the *Platypterygidæ*, was the only thing wanted. Every one knows to which family of *Bombyces* the *Platypterygidæ* have always been considered akin. Their larva was described by Linnæus himself, as "*Vinulæ* affinis" (Syst. Nat. vol. 2; p. 860); and Prof. Westwood succinctly expresses the relationship of the groups, when he says (Westw. Intr. ii. p. 362), "*Platypteryx* agrees with *Geometra* in the habit of the imago, but in its transformations it is much nearer to *Cerura*, amongst the *Bombycidæ*." Therefore the *Notodontidæ* (the family including *Cerura*) came naturally to be the separated section. Thus we have our new order worked out.

Although this arrangement secures its objects, I venture to think that it effects them in an empirical fashion; and also fails in effecting what an arrangement of the *Lepidoptera* should secure.

In the front of my objection, I of course place this starting of the *Noctuæ* from a few *Bombyces*, in order to preserve the order of the former group. But that has been sufficiently discussed. The erection of the family *Platypterygidæ* into a group, I confess appears to me a strong step. No author has yet described the *Platypterygidæ* as a separate group, not even Mr. Newman, who has faithfully followed the new order. He joins this family to the *Pseudo-Bombyces*, and calls both together "*Cuspidates*," a name he however explains is not a very good one (Brit. Moths, p. 204). The erection of the insect *Aventia flexula* into a separate group is also a very strong proceeding, and I much question whether both

that group "*Aventiæ*," and its neighbour *Deltoïdes*, were not both constituted primary groups, in order to keep the two essential ones *Drepanulæ* and *Pseudo-Bombyces* in countenance.

The new order shirks the affinity between *Geometra* and the *Deltoides*, and *Geometra* and *Pyralis*, of which M. Guenée spoke so strongly (in his Généralités, vol. 9); as well, of course, as shirking the necessity for re-arrangement of the *Noctuæ*; for, at present, the order of that group leads one (according to M. Guenée's own expressions) to expect more *Geometræ* to come at the end!

The union of *Sphinx* and *Bombyx* in one group I will not discuss. I say with all humility, that the proposition is, in my view, the result of an extreme disregard for the opinion of entomologists, no one of whom has been found to say a good word for the arrangement. The "group" *Nocturni* is properly stigmatised by Mr. Newman as "heterogeneous, and far too comprehensive" (Brit. Moths, pref. vi.).

It stands to reason, that the arrangement of families, made with a view to their proximity to certain other families, must require alteration when these last are no longer in proximity, and their place is taken by species totally different. But the feat to be accomplished by the apostles of the new arrangement was this, that though this reform was to be made, and the relations of the neighbouring families altered, yet no change was to be made in their order of arrangement. It was done, and the result is the group *Pseudo-Bombyces*—a creation in which, from its wonderful audacity, men are almost fain to see some merit.

Observe one way in which (*if* it was *necessary* to strain a point) the affinity of *Geometra* and *Bombyx* might be exemplified. At the end of *Bombyx*, place *Platypteryx*; then begin *Geometra*, taking the group as at present arranged, backwards; end *Geometra* with *Metrocampa*; then begin *Noctua* with *Erastria* and *Plusia*, etc.; there you have *Geometra* next to *Bombyx*,—the affinity victorious, and no outrage on common sense, such as an eruption of *Bombyces*, eight hundred species out place. Or again, place *Geometra before Bombyx*, end *Geometra* with *Amphidasys*, &c. (termed "Bombyciformes" by Hübner); then take the *Bombyces*, and go on from them to the *Noctuæ*; either by the *Bombycoïdæ*, or by *Gonoptera* as Latreille suggested.

But of course it does not rest with me, or any follower of the Linnæan order, to show M. Guenée how he may gratify his taste for tactical movements. M. Guenée had, before the new arrangement came out, done his best to condemn it by anticipation; for he had stated in the language I have quoted, that to place *Geometra* next to *Bombyx* would require a re-arrangement of the *Noctuæ*, though he has since fathered the proposition to carry out the innovation, and yet leave the *Noctuæ* as they were.

So much for the new arrangement. It was introduced in a List intended to catalogue synonyms, and the promulgation of it seems to have been considered a minor object, even by its authors. In England alone does it appear to have taken root. No writer on the Continent follows the plan; and the Americans do not so much as recognise its existence. In Dr. Packard's "Guide to the Study of Insects," one of the best entomological books ever written, the order of the *Lepidoptera* given is that of Linnæus, and the work contains numerous passages in support of that arrangement (see pp. 283-284, 293, 302, 318, &c.). In the preface (p. iv.) we read that this succession of the families of the *Lepidoptera* is "that now generally agreed upon by entomologists." It seems that lists without reasons are not accounted anything by the great nation beyond the Atlantic.

One word before we come to the "Lists," upon the principle on which changes in names are to be made. It is continually being discovered that, after an insect has been called by one name for, say, fifty years, it really ought to be called something else, because that name was "earlier." I leave out of the question the *doubt* which attends so many of these earlier names, arising from variable characters, imperfect condition of a specimen, from mis-coloration of a figure, or lack of descriptive acumen in the author,—all matters affecting the fidelity of a reference. But, supposing a prior name to be discovered clearly meant for the insect which has always been misnamed; is it always desirable to discard the wrong name? It is a maxim of law, which might with advantage govern scientific nomenclature, that *Communis error facit jus;* and, when the entomological world is startled by receiving orders to call all the old insects by new names, I think a craving for some good rule of this kind must be experienced by many. It

will always, to the majority, appear unreasonable, to require all people, nations, and languages, to give up a name on which the world is agreed, for some other no one living has before heard of. We have been only lately a good deal startled by receiving orders to call our Butterflies by names which are very new to us, and if our authors had shown a reasonable deference to the maxim *Communis error facit jus*, we might have been spared some disagreeables. The mode, however, of introducing changes in names—wholly unsatisfactory as it is—has effectually prevented any rule of this kind being even proposed, as we shall, I think, presently find.

In last years Transactions, appear some learned papers by Mr. Crotch, on the genera of *Coleoptera*,* showing how much confusion there has been in them; and the President in his address this year, suggests that it may be necessary to take some concerted action with a view to settlement. The concerted action will, I think I may prophesy, take this form, that all that is will be declared right, and the forgotten, if accurate, distinctions will be remitted to the oblivion from which they were dragged. It *is* too much to be told, as Mr. Dunning remarked was its effect, when the paper was read here, that "all the names by which we have been calling our beetles are wrong," and, when the information comes thus in a lump, the change is resisted. In principle, there is no difference between that case and the case of our Butterflies; everyone has agreed to call *Linea Linea*, and it is too much because some one else once called it by a different name, to ask the *whole* scientific world to abandon that and call the species *Thaumas*.

The mode, however, of introducing changes of names (in the English synonymic lists at least) is very unsatisfactory, and tells the reader nothing; and it is by no means surprising, that the changes themselves are therefore so unacceptable. One reason why they are so, is because they are unexplained. It is no explanation at all to scratch out the old name and write in the new one. At that rate, any one could make a very startling and real-looking list with a Latin dictionary and a list of abbreviations. Nor is it any explanation to write in the new name, leaving the old name underneath. That only shows what the erasure shows just as well—which name it is that is superseded.

* Trans. Ent. Soc. Lond. for 1870, pp. 41, 213.

To demonstrate that the practice followed furnishes no explanation is very easy. Either of two very substantial reasons at the least, very widely different in kind, may be the ground of a change in name. The first is, that the new name is found to have been published earlier than the old. The second is, that the old one is found to refer to another species. Now, no indication at all is given, by the English lists, which of *these* two reasons has caused the change of name. It may well be a very nice question (in the latter case) to what species the old name does refer, and unless a reference, at the very least, is given, each reader must do all the author's work again. The effect of the present fashion here is often to pass off, as the work of one of the old entomologists, the wholly inaccurate deduction of the modern editor.

In the case of a change of name, when the old name has been discovered to refer to a different insect, there may be circumstances of especial interest which make the author's omission to give references or extracts particularly unfortunate. Thus, where a name *Tantalus* is found, some fine day, supplanted in our lists by a new one (say) *Ixion*, the name *Tantalus* referring to another insect, it may well be that the true *Tantalus* has at some time or other occurred in England, that being, indeed, the most probable cause of the confusion. Here you have an interesting point raised directly, involving, perhaps, some curious question of geographical distribution. Such a discovery is impeded by the practice of the English list-makers to withhold reasons and references.

It is out of the question that all our entomologists should be equally well acquainted with the works of foreign authors, or should enjoy equal opportunities for deliberate study. If, indeed, they were so circumstanced, it is not for the interest of science that each should pursue his investigations for himself; but the acknowledged fact is, that access to foreign works, or old English works, is the privilege of a very few. Therefore, the giving of mere references to works that cannot be consulted is not a sufficient help to the reader; *extracts* and a *commentary* are both necessary.

Last year, a new "Cabinet List" appeared "printed on one side only," with the name of Dr. Knaggs as

editor. This list follows the "Manual," with many emendations of nomenclature, and a few suggestions for alteration of the order. Perhaps it may be considered that it did not lie with Dr. Knaggs, reproducing another man's work, to justify it; but at all events, the new things in the "Cabinet List" demanded some explanation.

The *Nolidæ* are included by Stainton (in the Manual) among the *Pyralidina*. Doubleday puts them with the *Nocturni;* Dr. Knaggs gives up the *Nolidæ,* and "recommends" their insertion amongst the *Bombyces* (Cabinet List, pp. 3, 11). He is careful not to state any reason at all, for the conveyance of this family across the dead bodies of seven hundred species, and the unlearned entomologist is left to think himself very stupid that he does not see it all quite clearly. Now, if the "Manual" order is so good, that it is proper to produce it anew after a lapse of twelve years, what obvious and crying error was made in the classification of *Nolidæ,* that Mr. Stainton's readers must blush to observe his arrangement any longer? The *Nolidæ* are by Westwood (Introd. to Mod. Class. vol. ii. p. 401) also classed with the *Pyrales,* but said to be allied to the *Tortrices,* and reasons for the opinion are given, drawn from the wings of the imago, and the cocoon. They are also classed with the *Pyrales* by Haworth, by Stephens, and by Curtis, the last-named of whom also notices their affinity to *Tortrix.* But Doubleday's List places the *Nolidæ* in the *Nocturni,* and Dr. Staudinger's also (in the family *Lithosidæ*). No reasons are given, and Dr. Knaggs politely "advises" that this should be their position.

It is of importance to recollect that Dr. Knaggs' List is published as a *labelling* list; and of the new practice of "advising" and "recommending" changes in a publication of this class, I shall have a few words to say before the conclusion of this paper.

Dr. Knaggs' List gives some other pieces of advice. It "recommends" that *Aventia* be placed in the *Noctuæ* after *Toxocampa,* and that the *Pterophori* come after *Nomophila* in the *Pyrales!* As to *Aventia,* I suppose anyone may express an opinion without its doing much harm, as the genus has long been treated as an outcast. The new arrangement makes it, as we have seen, a group by itself (placed between the *Deltoides* and *Pyralis*) an enterprising course at all events; Staudinger (another list writer)

places it in the *Noctuæ* already, and in the same position which Dr. Knaggs "recommends." Stainton had placed it in the *Geometræ*, following Hübner, Stephens, and others who had also done so. Here is a change in which surely the list-writers might spare us a few sentences in a foot-note.

But Dr. Knaggs also "advises" us to place the *Pterophori* among the *Pyrales;* and if a change of this sort is to be brought about thus in a labelling list, it is a waste of time ever to write a book.

In Dr. Knaggs' List, a rule to be observed in the construction of synonymic Lists is laid down, and a reason for it is given. The rule (expressed * by the way, in eccentric English) is that where the two sexes of a species have been named simultaneously, the name given to the female should be preferred. I am not concerned now with the reason; it is a great thing to have some reason advanced. But as to the author's confidence in his own rule, it is instructive to examine his treatment of a few well-known cases.

Linnæus "named simultaneously" the two sexes of the Meadow-brown Butterfly, terming the male *Janira*, and the female *Jurtina;* and Haworth actually did term the Butterfly *Jurtina* alone, which according to Dr. Knaggs was the only right name. Dr. Staudinger also suggests that *Jurtina* may be the better name, because it is given before *Janira*, in order. Dr. Knaggs, however, writes the species down *Janira*, in defiance of his own regulation. There are several other instances. *Sibylla* is, it is now admitted, the male name for our White Admiral Butterfly, and *Camilla* the female, both names being given by Linnæus; *Camilla* for a long time was the name in use in England, Haworth, Stephens, and Curtis (the two latter with emphasis) stating that *Camilla* is the name of our insect. Dr. Knaggs has *Sibylla* in his list. *Trochilium Cynipiformis* appears to be in a similar case, the female name being *Œstriformis*, Rottemburg. And to take one other instance, exceedingly easy to be veri-

* The following is Dr. Knaggs' "Note."—"Should the *sexes* of a species have been named simultaneously, *that of the female* is adopted, for the reason, that, while the ♂ is alone utterly incapable of perpetuating *its* species, the unimpregnated ♀ ♀ of several insects have the power of reproducing *their like*, and may therefore be considered to be of the higher organism." [I am responsible for all *italics*.]

fied; our own Haworth "named simultaneously" the two sexes of *Miana arcuosa*, the name *arcuosa* being given to the male. No one terms the species anything else than *arcuosa*, and Dr. Knaggs does not suggest that, according to his canon, the name *minima* (given to the female) must be accepted instead.

The reason he does not is, perhaps, the same which would control the action of any adventurous writer. A principle can be stated, and supported as a principle, without encountering any vigorous opposition. Entomologists at large do not know enough to see its effect, and choose not to quarrel with a learned writer till he makes an overt attack. Dr. Knaggs avoids encountering the displeasure of the collectors, but he does so at the cost of acknowledging that *Communis error facit jus*.

But do not the English entomologists demand *better work* than this? Theory and practice are not on speaking terms in Dr. Knaggs' list. Let us hope a list of labels will never again assume to introduce changes, or lay down a law.

Mr. Newman's "Natural History of British Moths" is a work extensively used by collectors of the unscientific class. The sort of practical joke, by which the later English writers carry off—I speak without offence—their autocratic manner, is played more than once in this book. The joke is almost *de rigueur* with authors on Lepidopterology. It consists in an assumption on the part of the writer, that he is addressing children, and a continual reference to his readers' youthfulness and inexperience. No one writes on the *Lepidoptera* for grown people! It is a very remarkable thing that the books now are always published for "the young collector." This is very pleasant for the authors, because they are saved a great deal of trouble. You do not give the reasons for things to children; they are satisfied without; and in a book written ostensibly for children, no one looks for anything very thorough or deep. It would be a pity, however, that an author should carry even this joke too far, because it might unjustly be imputed that he bid for the approval of the unscientific. I am beginning to fear that we shall not have any more English books that are not addressed to the school-room; and I have no expectation but that the title-page of the forthcoming work

by Dr. Knaggs will state, that it is "The Synonymy of the Lepidoptera of Great Britain and Ireland; expurgated for the young collector."

Mr. Newman's "Natural History," I venture to suggest, contains several passages, which are exceedingly objectionable to an independent mind. The passage which I mention is only quoted here, because it is necessary to take some instance in order to illustrate the views, which I respectfully urge in this paper. I take one instance and only one.

After describing the *Leucaniæ* and *Nonagriæ* and their allies, in whose names and order some changes are introduced, Mr. Newman prints an "observation" as follows: "In concluding the family of *Leucanidæ*, it seems desirable to allude to the changes which it has been deemed right to make in the names:"—This commencement gave me great pleasure; it is very desirable indeed, I think, not only to allude to, but also to discuss and explain all changes, whether in names or in arrangement. The passage continues: "But I believe I may state, that where I have departed from the names and arrangement of Mr. Doubleday's List, *it has been with the entire approval of that lepidopterist*" (Newm. Brit. Moths, p. 276). And so, it is enough, is it, to say that? An author is to chop and change the arrangement of the *Macro-Lepidoptera*, without a scratch of the pen for reason, and unblushingly present to us the results of the operation, stamped with someone else's "entire approval!" After carefully spreading the cloth, this is the stale crust Mr. Newman flings us to stay our starving capacities! What entomologists want is, not that changes should come to them "approved of" by this or that leading man, but that each author who proposes an alteration in classification or nomenclature for their adoption, should first state all his reasons, and then leave the "approval" to them. Haworth himself, whose follower Mr. Newman claims to be, tried to carry things through by other men's "approbation," and had to abandon summarily the very plan which he presented with such a flourish. I refer to Haworth's plan of uniform terminations for the names of all the *Lepidoptera*, which had, as he boasted, "the full and individual approbation of all the members of the Aurelian Society" (Haw. Lep. Brit.; pref. xix.; and pp. 139, 588).

Lists are, I suppose, divided into synonymic lists and labelling lists. Restricted to their proper objects, synonymic lists are very useful things; and while entomologists continue to label their collections, printed labelling lists will always play a useful, if a humble, part in the world of science.

A list is a list all the world over, and cannot be a treatise. To make a list answer the purpose of a treatise is at all events a very slovenly proceeding. But there are some functions which a list cannot perform. I am concerned only with one. A bare list cannot state reasons for results; it can only catalogue the results themselves. Now, was it ever designed in the institution of synonymic lists, that they should be an authority upon classification, or the medium for introducing important changes in arrangement? Classification is the highest incident of scientific study, which requires, if anything requires it, a full statement of reasons *pro* and *con.*, research, deliberation, careful discrimination between published conclusions. An opinion on a system of arrangement, formed without such preparation, would be absolutely worthless in a scientific point of view, by whomsoever it might be expressed. A list such as Mr. Doubleday's makes no pretence of affording any guide for the formation of a judgment, even on the propriety of the names; and as to *them*, rests entirely for its acceptability on the reputation of its author. But can it be tolerated, that a bare array of names, shaken into a certain order, shall be accepted as any authority that that order is natural or proper? Surely no list has or can have such authority, and there would be a stultification of science if it had. When we desire authorities upon System, we go to books, written by entomologists, who have given reasons for their plan. It has not been thought beneath the attention of the men most reverenced in science, to devote a studious lifetime to the perfecting of systems of classification. The works of those men remain, and will remain, the great authorities, though stacks of "synonymic lists" may leave our printing-offices year by year.

A mere list is not of any value even as corroborating or adopting an *existing* arrangement. An arrangement of insects depends for its acceptability on its own merits, and is no better if a hundred synonymic lists, without

reasons, are published following the same order. But what respect is such a list to receive, when it seeks to change and subvert an arrangement previously adopted? How completely absurd it is to accept as any authority a list, which, as if by its author's *ipse dixi*, supersedes the work of an entomologist who has given his reasons! Worse ignominy awaits us in the spectacle of our system re-organised by labelling lists! If the label writer keeps his place, people will buy his labels in the course of business, and his publisher's account may be expected to show a moderately satisfactory return. But if the label writer assumes too much, and pretends to be a systematist, we shall probably choose to deal somewhere else. When we buy a labelling list, it is generally with the confidence that if we do not secure a learned, we at least have a useful commodity. But if a label writer takes to tinkering the lists on his own account, not only is his new labour thrown away, but his own proper work is rendered untrustworthy. I have no hesitation in saying, that I regard the introduction of changes in arrangement in a list intended for labelling as an affront to science; and, if such a course is not considered to fix a stigma on the scientific reputation of an author, it is only because the ignorant and unreflecting collectors are so numerous that they constitute the majority and direct opinion.

I gladly dismiss this subject (on which, as will have been gathered, I hold a strong view) by suggesting a consideration which I think should weigh with any author, having pretensions to be a man of science. To publish changes in a labelling list for the first time, is to obtain a sanction for new views by *adventitious* means —a thing to be deprecated by all. I leave these gentlemen and their followers to the scourge of M. Guenée's trenchant sarcasm where, speaking of improper changes, he says they "tendent à se vulgariser chez nous par les nombreux entomologistes-amateurs qui ne possèdent, pour toute bibliothèque, qu'un catalogue qu'ils suivent aveuglément" (Lépidopt., vol. 9, p. xxxiii.).

An entomological book ought to fulfil the conditions required of all good books, according to its kind. If an entomological book seek to introduce alterations, an entomological book like any other book, ought to support those alterations by facts and reasoning. If it be sup-

posed (and I am reduced to believing that it is supposed), that entomology is a subject by itself, in which it is easy to be a great man, it is necessary to say that such a creed is a mistake. It may be the case that a writer of pre-eminent position, who has earned universal respect on a special subject, is allowed to transgress the ordinary rules, and his opinions alone carry weight without the reasons for them being stated. But there is certainly no living entomologist who stands in this position towards his fellow-students, and I am strongly inclined to believe that of all the sciences, this very one of ours is the one among whose votaries there is the greatest evenness of knowledge, and capacity for judgment, *cæteris paribus*, the men being matched in other respects. I have long entertained the opinion, that entomology is a science in which any student can obtain considerable proficiency, and that authors who treat of it ought to unbend to their readers, because their readers are often as clever as themselves. To publish conclusions without reasons, is not only not to unbend, but is a highly self-sufficient action; and in any other walk of literature would augur an exaggerated self-esteem and considerable disregard of other persons' judgment.

A good scientific book, then, I humbly contend, should state all the reasons for every opinion advanced, or scheme propounded, and should quote and discuss previous authorities bearing on the subject in hand. In fact, the book should *submit everything*,—reasons, authorities, conclusions—*to the judgment of the reader*.

First of all, is it an author's duty to absolve himself from the suspicion of chicanery. I candidly confess, the very first idea which crosses my mind when I take up a list or catalogue whose contents are not supported by reasons (published either in the book or elsewhere), is; to what extent is the writer of this a quack?

Mr. Doubleday and Dr. Knaggs treat me no better than does the dealer, at whose shop I may purchase to-morrow a little book professing to contain "Gardner's Arrangement." I have procured a copy of this publication, and I can assure the Society that it alters the order of the species, chops and changes the genera, and in all things enacts to the life the part of a thorough-bred "list." It is supported by no reasons of any sort, of course, but it is no worse in this than are the others.

Respect for the quarter of its origin does not prevent my deriding it as fanciful, and stigmatising its changes of the order as unmeaning; but am I quite sure it has not as good authority as the Cabinet List, "printed on one side only"? I do not follow the order of arrangement given in this dealer's list, because he shows me no reason why I should do so. What reason, pray, is offered me for following Mr. Doubleday's?

Surely I need not press further the imperative urgency there is for entomological writers to absolve their work from all appearance of chicanery. Next, it is (as I have already urged) an entomological writer's duty to furnish his readers with the materials for forming an independent judgment. For upon this, in great measure, depends whether or not his performance is worth our study. The English lists, as now published, afford no materials at all for estimating the writers' trustworthiness, and it is impossible, without doing the author's work over again for ourselves, to determine whether or not we shall avail ourselves of his labours. Indeed, a list of species, such as the English list-makers offer, is an absurd composition in every view—a list of names merely, with abbreviations of the nomenclators' names appended. No quotations, no references even, are supplied, much less foot-notes explaining the causes of this or that alteration in name or position.

An aim which I had in this paper was, that by asking the attention of scientific men to the method of introducing changes in arrangement, I might draw from them some expressions of disapproval of the existing fashion, such as may, perhaps, have the effect of establishing a better practice. The promulgation of important changes, by mere lists as barren as those I have slightly noticed, seems likely to become the rule, unless the opinion of entomologists is very decidedly expressed. The bewilderment continually felt (outside the publishing côterie) as to the reasons for the frequent changes is just now very general. Any understanding now arrived at would be most opportune, and have a good effect in removing feelings even of annoyance, which I think are not confined to a few. It is high time something were done.

I challenge any Lepidopterist to say, that he can look with complacency upon the development of entomological science in England for the last twelve years, in

which his fellow-students have been so unreasonably led, and have so unreasonably followed. The present condition of entomological literature in England is, so far as concerns the *Lepidoptera,* utterly unequal to the needs and below the capacities of the students of that Order.